

REMARKS

Thorough examination and careful review of the application by the Examiner is noted and appreciated.

Claims 1-20 are pending in the application. Claims 1-20 stand rejected.

**Claim Rejections Under 35 USC §112**

Claim 17 is rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner contended that the recitation of claim 17 is not readily ascertainable.

The rejection of claim 17 under 35 USC §112, second paragraph, is therefore respectfully traversed.

The Applicants fail to see any indefiniteness in the claim language of claim 17 in that, in addition to the process steps of independent claim 16 of a stationary soak/reciprocally soak processes, claim 17 further includes a third process step such

that stationary soak/reciprocally soak/stationary soak processes are disclosed. In other words, after the process steps of claim 16, the wafer is further stationarily soaked for at least 10 sec.

The rejection of claim 17 under 35 USC §112, second paragraph, is therefore respectfully traversed. A reconsideration for allowance of claim 17 is respectfully requested of the Examiner.

#### **Claim Rejections Under 35 USC §103**

Claims 1-2, 5-6, 9 and 15 are rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki '945 in view of Erk et al '505. It is contended that Komatsuzaki substantially teaches an apparatus and a method similar to that of the present invention and while Komatsuzaki fails to teach the frequency of an up and down motion, such is taught by Erk et al.

The rejection of claims 1-2, 5-6, 9 and 15 under 35 USC §103(a) based on Komatsuzaki and Erk et al is respectfully traversed.

Komatsuzaki discloses an apparatus for chemical etching of a wafer including an apparatus containing means for moving wafers in an up and down motion immersed in an etch solution. However, the Applicants agree with the Examiner that Komatsuzaki does not teach the frequency of the up and down movement.

Erk et al discloses a method for cleaning semiconductor wafers with sonic energy and **passing through a gas-liquid-interface** wherein the surface of a wafer repeatedly passes through a gas-liquid-interface. As clearly shown by Erk et al in Figs. 2 and 3, and at col. 5, lines 52-63:

"Operation of the motor 86 rotates the camming mechanism 62 about the axis X to simultaneously reciprocate and rotate the semiconductor wafers W. The reciprocation action causes the center C of each semiconductor wafer W to move up and down **between the upper level  $L_1$  (Fig. 2) and the lower level  $L_2$  (Fig. 3).** The level 48 of cleaning liquid in the bath 42 is selected to be generally midway **between the upper and lower levels  $L_1, L_2 \dots$** "

Furthermore, at col. 6, lines 2-5, Erk et al stated:

"As explained above, cleaning of the semiconductor wafers W in the sonic bath 42 is most effective at or near the gas-liquid-interface 46."

Erk et al therefore teaches a completely different cleaning method than that taught either by Komatsuzaki or the present invention. For instance, the present invention, as clearly recited in independent claims 1 and 9:

"means for reciprocally moving said wafer holder in an up-and-down motion with said at least one wafer immersed in said stripper solution at a frequency of not more than 100 cycle/min."

The Applicants respectfully submit that since Erk et al teaches a completely different cleaning method by using ultrasonic waves at a gas-liquid-interface, Erk et al does not teach a method in which a wafer is completely immersed in a stripper solution. As such, there can be no motivation to combine the teachings of Erk et

al with that of Komatsuzaki. Komatsuzaki discloses a cleaning method in which a wafer is completely immersed in an etch solution without ultrasonic waves. The Komatsuzaki reference therefore cannot be modified by the Erk et al reference in arriving at a §103(a) rejection since there can be no motivation to combine two completely different methods in arriving at the present invention. ✓

The rejection of claims 1-2, 5-6, 9 and 15 under 35 USC §103(a) based on Komatsuzaki and Erk et al is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claim 14 is rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al and further in view of Handbook of Semiconductor Wafer Cleaning Technology (The Book). It is contended that while the combined teaching of Komatsuzaki and Erk et al fails to disclose spin drying of wafers after processing, such is disclosed by The Book.

Claim 14 depends on claim 9 which the Applicants have shown is not taught or disclosed by the two primary references of Komatsuzaki, Erk et al, either singularly or in combination

thereof. The Applicants therefore respectfully submit that the additional reference of The Book does not lend any additional weight in a §103(a) rejection since the two primary references do not teach the basic process. A reconsideration for allowance of claim 14 is respectfully requested of the Examiner.

Claim 7 is rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al and further in view of Cardani et al '999. It is contended that while the combined disclosure of Komatsuzaki and Erk et al fails to teach the utilization of electrical heating means, such is disclosed by Cardani et al.

Analogous to the arguments presented above regarding claim 14, the Applicants respectfully submit that since the two primary references of Komatsuzaki and Erk et al does not teach the basic apparatus recited in claim 1, the additional reference of Cardani et al does not lend any additional weight in a §103(a) rejection. A reconsideration for allowance of claim 7 is respectfully requested of the Examiner.

Claims 8 and 10-11 are rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al and further in view of Ward et al '186. It is contended that while the combined teaching of Komatsuzaki and Erk et al does not provide for the stripper solution that contains DMSO and TMAH, such are disclosed by Ward et al in an aqueous composition comprising DMSO and TMAH.

Claim 8 depends on independent claim 1, while claims 10 and 11 depend on independent method claim 9. The Applicants have clearly shown that independent claims 1 and 9 are not rendered obvious by the two primary references of Komatsuzaki and Erk et al, the Applicants respectfully submit that Ward et al does not teach the basic apparatus of claim 1, nor the basic process of claim 9.

The rejection of claims 8 and 10-11 under 35 USC §103(a) based on Komatsuzaki, Erk et al and Ward et al is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claims 1-4 are rejected under 35 USC §103(a) as being unpatentable over Weber et al '431 in view of Erk et al '505 and further in view of Applicants' own prior art disclosure. It is

contended that Weber et al teaches a device for treating substrates including means for lifting and lowering or reciprocating vertically a wafer receiving device. While the teaching of Weber et al is silent on the frequency of the reciprocal motion, such is taught by Erk et al.

The rejection of claims 1-4 under 35 USC §103(a) based on Weber et al, Erk et al and Applicants' own prior art disclosure is respectfully traversed.

Weber et al discloses a device for treating substrates in a fluid container wherein a nozzle system is connected to the sidewalls and/or bottom of the fluid container for introducing a fluid into the fluid container (see Abstract). As recited in col. 4, lines 6-11, lines 23-24:

"By using nozzles for introducing the fluid it is also possible to introduce and allow the fluid to flow with high inflowing velocity and high throughput velocity per time unit into and within the fluid container so that, by maintaining a laminar flow, extremely high flow velocities can be achieved."

appas.



"The nozzles are preferably arranged at the bottom of the fluid container and, ..."

Furthermore, at col. 8, lines 29-33:

"Thus, within the fluid container 1 only a minimal amount of additional space for the substrate receiving device is required so that the fluid volume within the fluid container 1 can be maintained at a low level."

Weber et al therefore does not teach a wet stripping apparatus wherein, as clearly recited in the present invention independent claim 1:

"... said at least one wafer immersed in said stripper solution ..."

In the Weber et al apparatus, a spray of a fluid from a plurality of nozzles is used to clean the wafers and the fluid container 1 is not filled with the fluid, let alone filled to completely immerse the wafers. The fact that the nozzles of Weber et al are arranged at the bottom of the fluid container indicates

that it would have been impossible to spray the fluid onto the wafers if the container is full of the fluid. The Applicants further submit that the teachings of Erk et al and the Applicants' own prior art disclosure does not disclose the apparatus of claim 1.

The rejection of claims 1-4 under 35 USC §103(a) based on Weber et al, Erk et al and Applicants' own prior art disclosure is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claims 12-13, 16-17 and 20 are rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al and further in view of Noguchi '631. It is contended that while the combined teaching of Komatsuzaki and Erk et al does not indicate the step of stationary soaking of the wafer in treatment solution, such is disclosed by Noguchi.

The Applicants have shown that the basic method claim 9, and similarly the basic method claim 16, which contain the process step of immersing the wafer in the stripper solution is not taught or disclosed by the primary references of Komatsuzaki and Erk et

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al. The additional reference of Noguchi does not lend any additional weight in a §103(a) rejection for claims 12-13, 16-17 and 20. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claim 18 is rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al, Noguchi and further in view of Applicants' own prior art disclosure.

Claim 19 is rejected under 35 USC §103(a) as being unpatentable over Komatsuzaki, Erk et al, Noguchi and further in view of Handbook of Semiconductor Wafer Cleaning Technology (The Book).

The rejection of claims 18 and 19 under 35 USC §103(a) based on Komatsuzaki, Erk et al, Noguchi and Applicants' own prior art disclosure and The Book is respectfully traversed.


The Applicants have shown that the two primary references of Komatsuzaki and Erk et al does not teach the base method claim 16 in which a wafer is immersed in a stripper solution and reciprocally moved at a frequency of not more than 100 cycle/min.,

the Applicants respectfully submit that the additional references of Noguchi, Applicants' own prior art disclosure and The Book do not lend any additional weight in a §103(a) rejection since, Komatsuzaki cannot be modified by Erk et al which teaches a completely different cleaning method of sonic cleaning at a gas-liquid-interface. A reconsideration for allowance of claims 18 and 19 is respectfully requested of the Examiner.

Based on the foregoing, the Applicants respectfully submit that all of the pending claims, i.e. claims 1-20, are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,



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Randy W. Tung  
Reg. No. 31,311  
Telephone: (248) 540-4040